



Department of
Environmental Protection
Bureau of Land & Water Quality March 2003

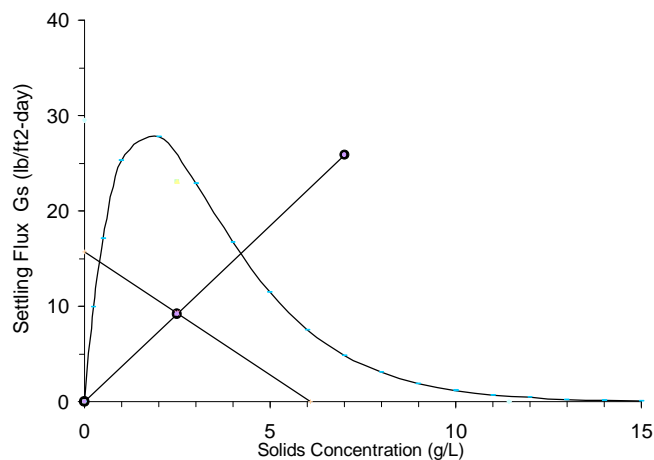
O&M Newsletter

A monthly newsletter for wastewater discharge licensees, treatment facility operators, and associated persons

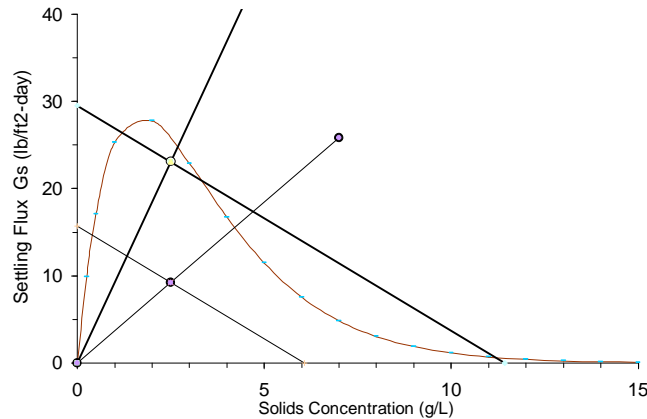
Clarifier Performance – Article 3 of 4

In our article last month, we showed how the State Point Analysis curve is developed. We use the concept of mass balance, whatever goes into a clarifier must come out, to draw some lines and determine the shape of a curve that reflects the quality of the sludge. In this article, we'll look at how the different lines and curves change as the operation of the clarifier changes and how you can use the State Point Analysis chart to learn some things about how your clarifiers work and put that knowledge to use in your facility.

We'll start with a simple example. In this facility, the flow equals 1.0 MGD, there are two (2) circular secondary clarifiers each 34 feet in diameter and the RAS flow rate is 0.7 MGD. The operator is running with 2,500 mg/L of mixed liquor suspended solids with an initial settling velocity (V_o) of 738 ft/d and a k factor of 0.6 L/g. Plotting the various lines, curves and points we discussed last month gives a graph that looks like the one below.

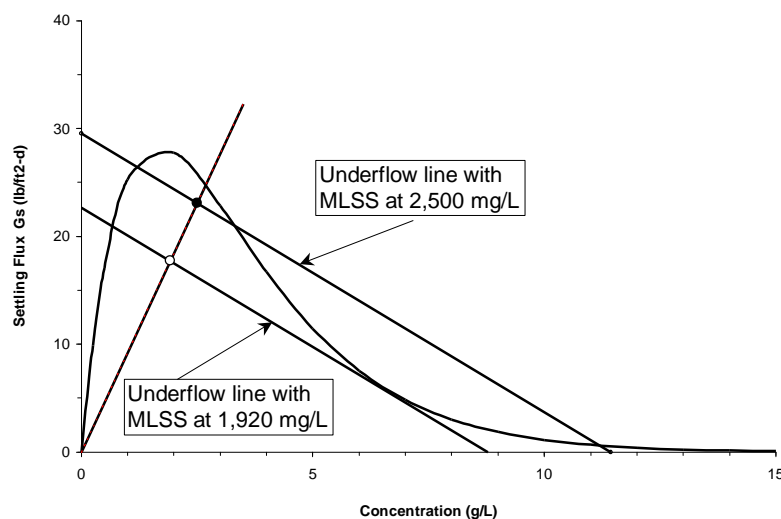


If the flow increases to 2.5 MGD and the return rate is not changed, we can add a second set of lines to the graph to show the effects of the additional flow. This graph is shown on the next page. It shows us some interesting (and not very good) things that will happen to the system.

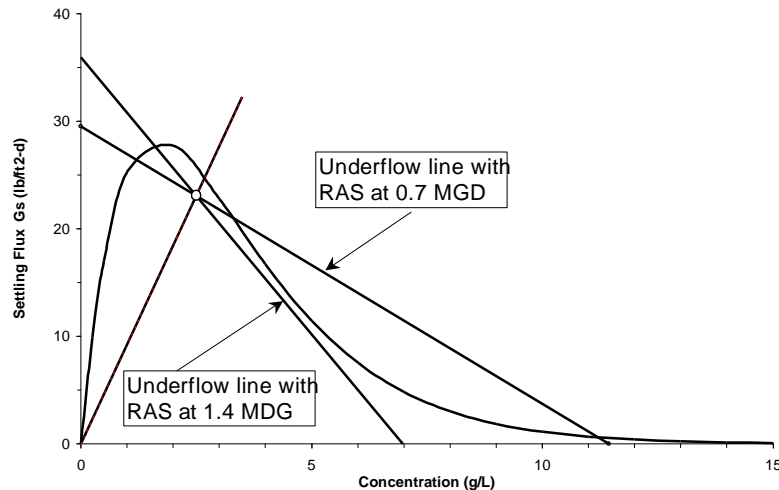


The increased flow causes the slope of the overflow rate operating line to get steeper. Since the mixed liquor concentration is still 2,500 mg/L, the state point on the new overflow operating line remains at that concentration (as shown by the open circle point). Since the underflow (RAS) rate is the same, the underflow operating line must be parallel to the original line and must go through the new state point. Notice that the point where the underflow rate line (the line that slopes down to the right) crosses the Settling Flux axis move from about 15.7 lb/ft²-day to almost 30 lb/ft²-day. Notice also that the underflow operating line is to the right of the settling flux curve. This means that the clarifiers are overloaded and they are receiving more solids than can successfully be transferred to the bottom, collected and removed. This sounds like a disaster in the making.

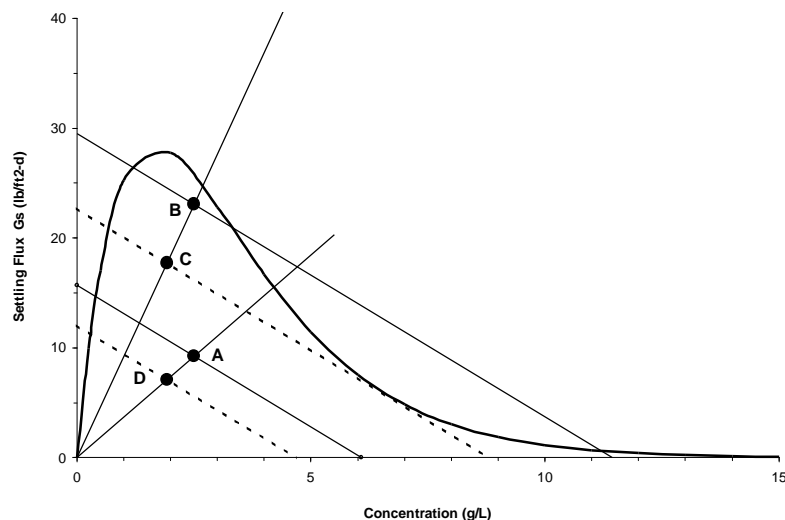
Luckily, the activated sludge process is forgiving, to a point. Because the clarifiers are overloaded, a sludge blanket will form. As the sludge blanket gets thicker, more of the solids in the system are transferred to the clarifiers and the MLSS in the aeration tank decreases. When the MLSS in the aeration tank decreases, the state point “slides” to the left and as it moves, the underflow rate line also moves until it just touches the settling flux curve. At that point, the clarifiers are “critically” loaded, which means that mass balance has been restored. But, almost one-quarter of the sludge in the system is now in the clarifiers. This is not an ideal situation, but if the blanket doesn’t go over the weirs, the system will maintain good treatment.



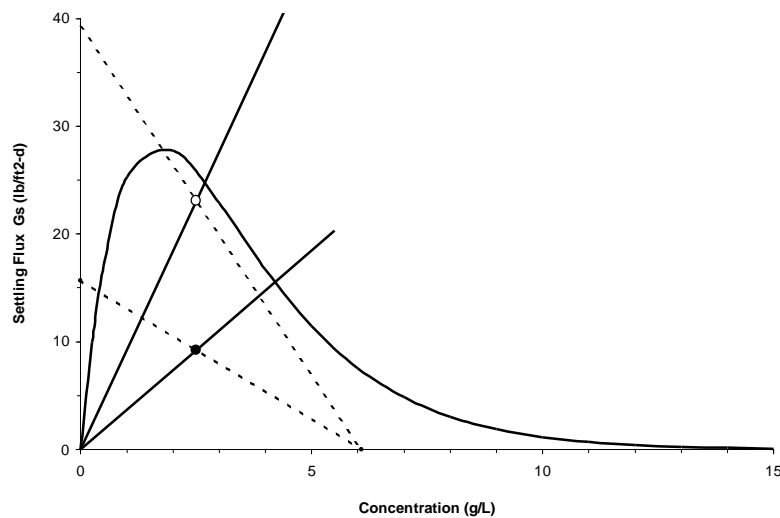
If, instead of letting the system correct itself, the operator increases the RAS rate as the influent rate increases, what happens? As you can see in the chart below, the slope of the underflow rate line gets steeper and the underflow line is now all under the settling flux curve. The clarifier is underloaded and a blanket should not form or, if there is a blanket, it should not increase. Many operators are concerned about raising the return rates because they think the solids loading rate to the clarifiers will be too great and washout will happen. As this chart shows, even though the solids loading rate does increase, as long as the underflow rate line is under the settling flux curve, the sludge will stay in the clarifier.



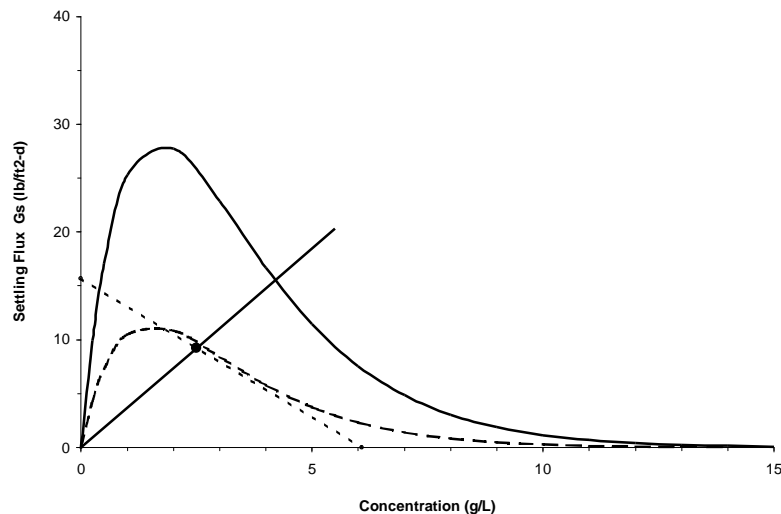
We can use the state point analysis chart to look at what happens in a system when the flow varies during the day. Let's assume that the facility has two flow rates during the day: a normal flow of 1.0 MGD and a high flow of 2.5 MGD. This may seem funny, but the system will react the same, regardless of how the flows change within these bounds. Let's start with the flow at 1.0 MGD, the RAS rate is 0.7 MGD, and the MLSS at 2,500 mg/L. That gives us a state point at **A** and everything is good. If the influent flow suddenly increases to 2.5 MGD and the RAS flow remains constant at 0.7 MGD, we move to state point **B** and the clarifiers are overloaded. A sludge blanket will form (or increase in depth if a blanket is already there) and solids will start to build up in the clarifier. As the MLSS in the aeration tanks become more dilute, we move to state point **C**, where the clarifiers are no longer overloaded and things are back to steady state. If the influent flow now drops quickly to 1.0 MGD, we move to state point **D** and the sludge will slowly move back to the aeration tanks until we reach the state point **A**, where we began.



Some facilities run with a fixed RAS rate, regardless of the influent flow. This is the situation we just looked at and you can see, if there was a significant sludge blanket in the clarifiers before the influent flow increased, you could have a washout of solids and a permit violation. If the RAS rate is set as a percentage of the influent flow, the solids loading to the clarifier will change but the underflow rate line should stay below the settling flux curve and the sludge should stay in the clarifiers. Let's look at the previous example but we'll set the RAS rate at 70% of the influent. When the flow is at 1.0 MGD and the RAS rate is at 0.7 MGD we have our original state point at **A**. When the flow increases to 2.5 MGD, the RAS rate increases to 1.75 MGD and the state point moves to **B**. Notice that the underflow rate line stays below the settling flux curve and the clarifiers remain under critical loading. This means that the sludge blanket, if any, should not increase even though the solids loading rate has increased.



Finally, we'll look at what happens if the sludge quality deteriorates. Assume we have filamentous bacteria that "bloom" in the system. The sludge quality changes from an initial settling velocity (V_o) of 738 ft/d and a k factor of 0.6 L/g to with an initial settling velocity (V_o) of 325 ft/d and a k factor of 0.66 L/g. Now, the settling flux line is very much different than our original situation with influent flow of 1.0 MGD, RAS of 0.7 MGD and MLSS at 2,500 mg/L is right on the edge. Any increase of flow will probably mean a loss of solids and a permit violation.



Next month, we'll finish this series with a discussion of some "real world" examples and we'll look at some models that can be used to predict V_o and k using SVI data.

"ONE PLAN" / INTEGRATED CONTINGENCY PLAN

(Attendees will be awarded 6.0 TCH's with 100% attendance)

This workshop will provide the "how to" skills needed to develop a "One Plan"/Integrated Contingency Plan, based on EPA's Bolder Model.

Including how to incorporate the following into a functional plan:

- * List of chemicals or MSDS's
- * Plant drawings
- * Process flow diagrams
- * Piping & instrumentation diagrams
- * Design codes & standards
- * Safety systems specifications (alarms, sprinklers, etc.
- * All current emergency response procedures

Instructor:

Leonard Wallace IV

(EPA, New England-Emergency Planning and Community Right to-Know (EPCRA) Team)

Sponsored by:

Northeast Rural Water Association

Dates: Tuesday, May 20th & Wednesday, May 21st 2003

Locations: VA Hospital/William A. Yasinski Building RM 103
 (White River Junction, Vermont), (May 20th)
 Amherst Wastewater Facility, Amherst MA, (May 21st)

Time: These programs will start promptly at 8:30 a.m. concluding
 at 3:30 p.m. with an 8:00 a.m. registration. Seating will be limited to
 the first 20 registrants

Cost: \$20.00 for refreshments and material. Training is free!
 (Seminar registration must be prepaid accompanied by a registration form!)

Who should attend: This workshop is designed for Water/Wastewater facilities that need to develop or review their existing emergency response plans to meet EPA and OSHA rules. The "One Plan"/Integrated Contingency Plan is used for responding to releases of non-radiological hazardous substances and oil.

These include:

- * Chemical releases, both chemical & physical hazards
- * Fires
- * Oil spills
- * Explosions
- * Natural disasters

Objectives of Program: Attendees will learn how to draft and utilize the "One Plan"/Integrated Contingency Plan to consolidate the multiple plans into one functional emergency response plan or integrated contingency plan (ICP).

Why Should You Attend : The " ONE PLAN " / Integrated Contingency Plan will:

- * Minimize duplication of emergency response plans
- * Improve economic efficiency
- * Provide an Integrated Contingency Plan for First Responders
- * Improve coordination between facility response personnel and local, state and federal emergency personnel

REGISTRATION LIMITED TO 20, REGISTER EARLY (NO WALK-INS ALLOWED)

For Practice

1. A drum contains 45 gallons of a solution of a chemical dissolved in water. If the weight of the chemical is 21 pounds, what is the specific gravity of the solution?
 - a. 1.01
 - b. 1.03
 - c. 1.05
 - d. 0.97
2. One kilowatt is the same as
 - a. 1.34 horsepower
 - b. 15 amps at 120 volts
 - c. 1000 MHz
 - d. 1.38 kilowatt hours
3. Which of the following chemicals is the best disinfectant?
 - a. Dichloramine
 - b. Hypochlorous Acid
 - c. Monochloramine
 - d. Nitrogen Trichloride
4. Who is responsible to see that safety rules are followed throughout the plant?
 - a. The Plant Manager
 - b. The Chief Operator
 - c. The Plant Safety Operator
 - d. Every Employee

Tip of the week

Shovel off those clarifier covers! One of Loring's clarifier covers collapsed recently while they were on it shoveling it off. Lessons learned: There is a lot of snow and it's unevenly distributed due to lots of wind this winter. Aging fiberglass covers need to have snow removed more frequently. Snow removal needs to be done symmetrically and as uniformly as possible to avoid uneven stressing on the domes. In Loring's case the shoveled side bowed upward, the unshoveled side buckled and collapsed and the shoveled side then followed.

Don Albert

Operator Certification Renewals

If you were due to renew in 2003 and did not contact us by March 1st, your certification has been placed in *inactive* status. If you are the operator in responsible charge of your treatment facility, it is illegal for you to sign the DMR or Form 49 until you reactivate your certificate. If you were due to renew your certification and did not contact us before March 1st, **Please contact us as soon as possible!**

YOUR FACILITY ON THE WWW: ECHO

All of the compliance data for your facility for the past two years is now available on the Internet at EPA's new Enforcement and Compliance History Online (ECHO) website. It is extremely important that you read this article and then visit the site to check the accuracy of the data for your facility!

Anyone with access to the Internet can use ECHO's pilot site. Simply enter the following address to open the "Enforcement & Compliance History Online (ECHO)" WebPages for your wastewater facility, or any other EPA regulated facility: <http://www.epa.gov/echo>. This EPA site allows users to find inspection, violation, enforcement action, and penalty information about a facility for the past two years. Citizens now have a single point of access to environmental compliance information. Let's look up a facility in ECHO and see what is there.

Navigating ECHO

From the ECHO home page, I entered a city and state (Augusta, ME) in the *Search in Your Community* section, and clicked on *GO*. This produced a list of 16 facilities, from American Tissue Mills to the University of Maine at Augusta. Since I was looking for the public wastewater facility, I then clicked on *Augusta Sanitary District* to get to the Detailed Facility Report. Another way to navigate to this information is to click on *Search Water Data* on the ECHO home page. This takes you to a search page that has a number of search criteria. The easiest method seems to be to simply scroll down to *Geographic Location* and enter the city and state, scroll down to *Search The Data* and check the *Include Minor Facilities* box, and then click on *Search*. This returns a list of four records in the water program. Again, click on the

name of the specific facility to get to the report.

So, by now you should be looking at the detailed facility report. Where is this data from? According to the EPA, ECHO is a Web interface that draws data from the Integrated Data for Enforcement Analysis system (IDEA). IDEA, operated by EPA's Office of Enforcement and Compliance Assurance, integrates facility data from disparate EPA databases. For the Clean Water Act (CWA), ECHO reads the water data that IDEA copies from the Permit Compliance System (PCS). The EPA, Maine and the facilities collect the data that are submitted to PCS. The ECHO home page includes a list of frequently asked questions and acronyms that are useful when deciphering a report.

According to the facility report I accessed, the Augusta WWTP on Jackson Avenue is a major facility. If you look under the *Inspection and Enforcement Summary* heading you will see that there has been no formal enforcement during the last two years. The *Inspection History* section shows that there have been six inspections and the *Compliance Summary Data* section reports that the facility is not in significant non-compliance (SNC) status. The *Two Year Compliance Status by Quarter* section is somewhat more difficult to read, and I recommend clicking on the Data Dictionary button to translate the codes.

ECHO reports provide a snapshot of a facility's environmental record, showing dates and types of violations, as well as the State or Federal government's response. Four key components of the enforcement process at regulated facilities are documented in EPA databases:

1. The occurrence of a monitoring event such as an

- inspection/evaluation or a self-report;
2. The determination of a violation (noncompliance);
 3. The occurrence of a government enforcement action to address violations; and
 4. Penalties associated with enforcement actions.

Data Errors

There are several ways that incorrect data can be recorded in ECHO. Since anyone can look at ECHO it is important for operators to review what is on this site and try to get corrections made. Then ECHO will accurately represent their facility.

Violations may be incorrectly shown in PCS. If the authorized State, in our case Maine, does not receive and enter the DMR to PCS by the designated due date, then the system will automatically flag the facility as being in significant noncompliance for not reporting the required pollutant discharge data. It is possible that lack of timely data entry (and not failure to timely submit the DMR) caused the facility to be put into the violation category. If this situation occurs, the determination of significant noncompliance can be manually overridden by EPA or the State until the information is put in the system and the actual compliance status can be automatically determined. As a regulated facility, if you have reported your DMR on time, but see a DMR-non receipt violation in the ECHO system, you should report the error via the online error reporting button. The ECHO site states that EPA has taken efforts to minimize these mistakes, which are very infrequent.

The *Report Error* button is located on the upper right hand corner of a Detailed Facility Report page. Clicking on this button will take you through a series of pages requesting specific information on the line that contains the error. You will receive

email confirmation that EPA has received the error, then a second email (usually within 2 business days) that the error has been routed to an EPA or State Action Officer for research. You are also provided with the email address for the Action Officer. When the changes are made, a final email with the resolution by the action officer is sent. The user will see the correction the next time the data is refreshed.

If you go back to the ECHO home page, click on *More State Data*, then *Echo Information about Maine*. This will take you to the Maine DEP's supplemental page on ECHO

(<http://www.state.me.us/dep/echo/>). The DEP page explains that there may be gaps in ECHO information - an ECHO report may show that a facility has had violations during a particular time period and an enforcement action has not been taken. A significant limitation on the information is that many actions taken by Maine DEP, such as the issuance of a Notice of Violation (NOV) or the proposal and ongoing negotiation of an Administrative Consent Agreement (ACA), are not recognized in ECHO-generated reports as enforcement actions. As a result, the data in an ECHO report may appear to show violations not addressed, when actually the violations ended long ago and an enforcement case is actively being pursued to resolution.

Give it a try. Look up your facility, or your city, or your watershed. You may be amazed by all the information that can be viewed. Once you have mastered ECHO, you may want to give the EPA's Envirofacts Data Warehouse a spin:

http://www.epa.gov/enviro/html/pcs/pcs_overview.html.

Approved Training

March 18, 2003 in North Vassalboro, ME -
Basic Chemistry - Sponsored by JETCC,
(207) 253-8020 – Approved for 6 hours.

March 27, 2003 in Bangor, ME –
Developing a Capacity, Management,
operation and Maintenance Program
(CMOM) - Sponsored by JETCC, (207)
253-8020 – Approved for 3 hours.

March 27, 2003 in Bangor, ME – Review of
Maine's New Stormwater Rules - Sponsored
by JETCC, (207) 253-8020 – Approved for
3 hours.

April 2, 9, 16 & 30, 2003 in Biddeford, ME
– NPDES Laboratory Procedures -
Sponsored by MRWA (207) 729-6569 –
Approved for 16 hours.

April 9, 2003 in Presque Isle, ME - Using
Advanced Technologies to Maintain
Compliance Though residual control -
Sponsored by JETCC, (207) 253-8020 –
Approved for 6 hours.

April 15, 2003 in Augusta, ME - Seeded
BOD, E. Coli, Solids and Microscopic
Examination – A hands on lab review -
Sponsored by JETCC, (207) 253-8020 –
Approved for 6 hours.

April 17, 2003 in Waterville, ME – Hands-
On Confined Space Entry and Non-Entry
Rescue - Sponsored by MRWA (207) 729-
6569 – Approved for 6 hours.

April 17, 2003 in Brunswick, ME –
Wastewater Treatment Certification Review
Grades IV & V - Sponsored by MRWA
(207) 729-6569 – Approved for 6 hours.

April 30, 2003 in Brewer, ME - Confined
Space Entry - Sponsored by JETCC, (207)
253-8020 – Approved for 6 hours.

April 30, 2003 in Hallowell, ME –
Excavation: Competent Person Training -
Sponsored by MRWA (207) 729-6569 –
Approved for 6 hours.

May 1, 2003 in Bangor, ME – Wastewater
Treatment Certification Review Grades IV
& V - Sponsored by MRWA (207) 729-
6569 – Approved for 6 hours.

May 1, 2003 in York, ME – Excavation:
Competent Person Training - Sponsored by
MRWA (207) 729-6569 – Approved for 6
hours.

May 7, 2003 in Bangor, ME – Wastewater
Treatment Certification Review Grades I-III
- Sponsored by MRWA (207) 729-6569 –
Approved for 6 hours.

May 6, 2003 in Saco, ME - Physical
Chemical Wastewater Treatment -
Sponsored by JETCC, (207) 253-8020 –
Approved for 6 hours.

May 8, 2003 in Presque Isle, ME –
Wastewater Treatment Certification Review
Grades IV & V - Sponsored by MRWA
(207) 729-6569 – Approved for 6 hours.

May 6, 2003 in TBA, ME – Pumps & Pump
Station Maintenance and Diesel Generator O
& M - Sponsored by MRWA (207) 729-
6569 – Approved for 6 hours.

May 7, 2003 in TBA, ME – Pumps & Pump
Station Maintenance and Diesel Generator O
& M - Sponsored by MRWA (207) 729-
6569 – Approved for 6 hours.

May 8, 2003 in Presque Isle, ME –
Wastewater Treatment Certification Review
Grades I-III - Sponsored by MRWA (207)
729-6569 – Approved for 6 hours.

May 15, 2003 in Mexico, ME – Hands-On Confined Space Entry and Non-Entry Rescue - Sponsored by MRWA (207) 729-6569 – Approved for 6 hours.

May 21&22, 2003 in Bangor, ME, - Basic Lab Procedures w/ NEWEA Exam - Sponsored by NEIWPC, (978) 323-7929 – Approved for 10 hours.

May 20, 2003 in Houlton, ME – Excavation: Competent Person Training - Sponsored by MRWA (207) 729-6569 – Approved for 6 hours.

May 21, 2003 in TBA, ME – Excavation: Competent Person Training - Sponsored by MRWA (207) 729-6569 – Approved for 6 hours.

December 2&3, 2002 in Freeport, ME - MRWA Annual Conference – Sponsored by MWRA, (207) 729-6569 – Approved for TBA hours.

Spring Certification Exam Notice

Note that the spring certification exam will be given on May 14, 2003. Applications for that exam must be **postmarked by March 29, 2003 or received by March 31, 2003.** If you missed out on the fall exam, study up and take it in the spring.

New Wastewater Compliance Contact Person at EPA

Joan Serra, who assumed the role of EPA's wastewater compliance contact for the State of Maine approximately one year ago will be taking a new job with the agency in April. She will be replaced by Douglas Koopman. Mr. Koopman is an environmental engineer with EPA and has been a compliance inspector with the Air program for the past ten years.

Answers to For Practice:

1. c 45 gallons of pure water weigh about 375.3 pounds. Adding 21 pounds of chemical to the water brings the total weight to 396.3 pounds. Divide 355.5 pounds by 45 gallons give a weight per gallon of 11.85 pounds/gallon. The ratio of the weight/gallon of the solution to the weight/gallon of pure water is the specific gravity, which is 1.05.
2. a A kilowatt is 1000 watts. 1 Horsepower is 0.746 Kilowatts. thus, one kilowatt is 1000/746 or 1.34 horsepower.
3. b When chlorine reacts with water, many compounds are formed. Chlorine reacts with any ammonia in the water to form mono- and dichloramines and nitrogen trichloride. The chloramines will act as disinfectants but because the chlorine is chemically bound to the nitrogen atom, it is less effective than the free chlorine available from hypochlorous acid.
4. d Every employee is responsible for knowing the safety rules, practicing those rules and reminding other employees if they forget to follow accepted safety practices. While managers and safety officers can define the safety rules and practices, a plant is safe only when every employee knows and follows those rules and practices.

Spill and Bypass Reporting

Please note this important reminder about reporting spills, bypasses, and other reportable events to EPA and the Maine DEP.

If you have a waste discharge license from the State of Maine, and a NPDES permit from the EPA, please make sure and report these events to both your State of Maine compliance inspector and to Mr. Koopman at EPA.

If you have already been issued a MEPDES license, then you only need to report these events to your State of Maine compliance inspector.

Mr. Koopman's contact information is listed below:

Douglas Koopman
Environmental Engineer
Office of Environmental Stewardship
U.S. Environmental Protection Agency
1 Congress Street, Suite 1100 (SEA)
Boston, Massachusetts 02114-2023

TEL: 617-918-1747
Fax: 617-918-1810
E-mail: koopman.douglas@epa.gov

New Wastewater Compliance Inspectors at DEP

As many of you know, last August David Dodge and David Coffin retired from the DEP after many years of service as compliance officers in the Augusta region. The DEP has hired two new compliance officers for the Augusta region, Beth DeHaas and Denise Behr. Beth replaces David Dodge as the lead inspector for the Augusta region. Beth has worked for DEP for 14 years, most recently as a compliance inspector in the Bureau of Remediation and Waste Management. She is joined by

Denise, who will fill the other vacated compliance inspector position in the Augusta region. Denise also has worked for the DEP for more than 10 years, most recently as a license writer for the Overboard Discharge Program in the Bureau of Land & Water. They will begin making the rounds to their assigned facilities starting this month.

Beth DeHaas 287-4860
beth.dehaas@maine.gov
Denise Behr 287-7773
denise.behr@maine.gov

Those facilities that were temporarily assigned to Don Albert, Sterling Pierce, Ken Jones and Dick Darling will be assigned to either Beth or Denise. Beth and Denise will be communicating with the facility staff regarding the reassignments.

Contact Person for DMR QA Study 22

Ken Jones has taken over for the retired David Dodge as the DEP contact for DMR QA Study 22. Any questions may be directed to Ken by phone or by e-mail. Ken's phone number is 287-4869, and his e-mail address is: ken.jones@maine.gov